CLAIMS

What is claimed is:

1. A digital online active test - plant protection system (DOAT – PPS) in a nuclear power plant, comprising:

a test generating computer (TGC) for generating a test input being a command to initiate a test and a test signal position bit indicating that said test input is currently generated at what position of the process parameters;

a trip algorithm computer (TAC) for receiving plant operating parameters via a plurality of measuring channels physically and electrically isolated and then comparing the measured operating parameters and a predetermined limit values to determine a trip state, if there is a test input by said TGC;

a voting algorithm computer (VAC) for receiving trip signals from each of the plant operating parameters determined by said TAC, determining whether a reactor has to be stopped or not and then outputting a signal to stop the reactor; and

a pattern recognition computer (PRC) for expecting a signal pattern from the state of the reactor, comparing the signal pattern with the reactor trip signal generated by said VAC, and then if the signal pattern and the reactor trip signal are not consistent, determining to stop the reactor.

2. The digital online active test - plant protection system (DOAT – PPS) in a nuclear power plant according to claim 1, wherein the plant operating parameters received from said TAC include a variable over power trip for stopping the reactor if the change ratio of the neutron flux is increased over a program set value or the neutron flux reaches a predetermined maximum value; a high logarithmic power level trip for securing the safety of a cloth and a reactor coolant pressure boundary when accidents such as dilution of boric acid or extraction of an uncontrollable control rod are occurred; a high local power density trip for stopping the reactor when a core maximum output density is

locally over a specific value; a low Departure From Nucleate Boiling Ratio (DNBR) trip for stopping the reactor when the DNBR reaches a predetermined minimum value; a high pressurizer pressure trip for ensuring the safety of the reactor coolant pressure boundary when a medium frequency and a rare frequency, which could be over-pressured, are occurred; a low pressurizer pressure trip for assisting the DNBR trip, preventing accessing the safety limit value ands assisting an engineering safety equipment system when an accident of loss of the coolant is occurred; a low steam generator level trip for preventing that the reactor is pressurized due to absence of a thermal removal source such as loss of a water supply; a high steam generator level trip for not allowing moisture from a vapor generator to enter a turbine to prevent damage of the components; a low steam generator pressure trip for assisting an engineering safety equipment system in order to prevent the reactor coolant from cooling when a steam tube is disrupted; a low reactor coolant flow trip for sensing the pressure difference between the front and rear stairs in the primary side of the steam generator and for generating a reactor trip if the pressure difference falls by a significant ratio or under a predetermined minimum value; a high containment pressure trip for generating a reactor trip signal if the containment pressure reaches a set value; and a manual reactor trip by which the reactor can be tripped in a main control room.

3. The digital online active test - plant protection system (DOAT – PPS) in a nuclear power plant according to claim 1, further include a manual test computer (MTC) for providing an input and output function by which an operator can monitor and control input/output signals from said TGC, said TAC, said VAC and said PRC.

4. The digital online active test - plant protection system (DOAT – PPS) in a nuclear power plant according to claim 1, further includes a remote control module (RCM) installed at a main control room, for displaying the operating state of the system and for performing various functions necessary to monitor the test and maintain the system.

5. A digital online active test plant protection method in a nuclear power plant, comprising:

a first step of generating a test input being a command to initiate a test and a test signal position bit indicating that said test input is currently generated at what position of the process parameters;

a second step of receiving plant operating parameters via a plurality of measuring channels physically and electrically isolated and then comparing the measured operating parameters and a predetermined limit values to determine a trip state, if there is a test input in said first step;

a third step of receiving trip signals from each of the plant operating parameters determined by said second step, determining whether a reactor has to be stopped or not and then outputting a signal to stop the reactor; and

a fourth step of expecting a signal pattern from the state of the reactor, comparing the signal pattern with the reactor trip signal generated by said third step, and then if the signal pattern and the reactor trip signal are not consistent, determining to stop the reactor.

6. The digital online active test - plant protection method in a nuclear power plant according to claim 3, wherein the plant operating parameters include a variable over power trip for stopping the reactor if the change ratio of the neutron flux is increased over a program set value or the neutron flux reaches a predetermined maximum value; a high logarithmic power level trip for securing the safety of a cloth and a reactor coolant pressure boundary when accidents such as dilution of boric acid or extraction of an uncontrollable control rod are occurred; a high local power density trip for stopping the reactor when a core maximum output density is locally over specific values; a low Departure From Nucleate Boiling Ratio (DNBR) trip for stopping the reactor when the DNBR reaches a predetermined minimum value; a high pressurizer pressure trip for ensuring the safety of the reactor coolant pressure boundary when a medium frequency and a rare frequency, which could be over-pressured, are occurred; a low pressurizer pressure

trip for assisting the DNBR trip, preventing accessing the safety limit value ands assisting an engineering safety equipment system when an accident of loss of the coolant is occurred; a low steam generator level trip for preventing that the reactor is pressurized due to absence of a thermal removal source such as loss of a water supply; a high steam generator level trip for not allowing moisture from a vapor generator to enter a turbine to prevent damage of the components; a low steam generator pressure trip for assisting an engineering safety equipment system in order to prevent the reactor coolant from cooling when a steam tube is disrupted; a low reactor coolant flow trip for sensing the pressure difference between the front and rear stairs in the primary side of the steam generator and for generating a reactor trip if the pressure difference falls by a significant ratio or under a predetermined minimum value; a high containment pressure trip for generating a reactor trip signal if the containment pressure reaches a set value; and a manual reactor trip by which the reactor can be tripped in a main control room.

7. A recording medium readable by a computer and on which a program is recorded, said program executing:

a first step of generating a test input being a command to initiate a test and a test signal position bit indicating that said test input is currently generated at what position of the process parameters;

a second step of receiving plant operating parameters via a plurality of measuring channels physically and electrically isolated and then comparing the measured operating parameters and a predetermined limit values to determine a trip state, if there is a test input in said first step;

a third step of receiving trip signals from each of the plant operating parameters determined by said second step, determining whether a reactor has to be stopped or not and then outputting a signal to stop the reactor; and

a fourth step of expecting a signal pattern from the state of the reactor, comparing the signal pattern with the reactor trip signal generated by said third step, and

then if the signal pattern and the reactor trip signal are not consistent, determining to stop the reactor.